

PRACTICE PROBLEMS

PROBLEM 1. A man walks 3.0 km due east, then 1.0 km 45° north of east, and finally 2.0 km 30° south of west. Use the tip to tail method, the parallelogram method, and the trigonometric component method to determine his final displacement from his starting point.

ANS. 2.0 km $\angle 8.4^\circ$ south of east

PROBLEM 2. Use the trigonometric component method to determine the sum of the following displacement vectors:

A = 5.0 m $\angle 37^\circ$ N of E, **B** = 6.0 m $\angle 45^\circ$ N of W,
C = 4.0 m $\angle 30^\circ$ S of W, **D** = 3.0 m $\angle 60^\circ$ S of E.

ANS. 3.4 m $\angle 50^\circ$ N of W

PROBLEM 3. In a particular laboratory experiment, a spring gun placed on a table fires a steel ball horizontally outward. A student determines that the ball starts 1.0 m above the floor and travels 2.7 m horizontally before striking the floor. Determine the a) time that the ball is in the air and b) initial velocity of the ball.

ANS. a) 0.45 s, b) 6.0 m/s

PROBLEM 4. The gun described in the previous problem was then arranged at a 45° angle above the horizontal and the student determines that the ball leaves the muzzle of the gun 1.1 m above the floor. Assuming that the initial velocity of the bullet remains the same, determine the a) total time that the ball is in the air and b) horizontal range of the projectile.

ANS. a) 1.1 s, b) 4.6 m